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Dividing the Land: Time and Land Division in the English North Midlands and Yorkshire

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Land divisions are ubiquitous features of the British countryside. Field boundaries, enclosures, pit alignments, and other forms of land division have been used to shape and delineate the landscape over thousands of years. While these divisions are critical for understanding economies and subsistence, the organization of tenure and property, social structure and identity, and their histories of use have remained unclear. Here, the authors present the first robust, Bayesian statistical chronology for land division over three millennia within a study region in England. Their innovative approach to investigating long-term change demonstrates the unexpected scale of later 'prehistoric' land demarcation, which may correspond to the beginnings of increasing social hierarchy.

Keywords: land division, field systems, Bayesian modelling, long-term change, radiocarbon

INTRODUCTION

From later prehistory to the present day, land divisions (field systems, boundaries, trackways, and enclosures) are ubiquitous features of the British countryside, providing evidence for cultivation, animal husbandry, political power, and social identity. Land divisions are remarkably common, with around seventy per cent of the English landscape currently organized within field systems (McOmish, 2011). Even the highest and most remote landscapes have been divided into parcels,

while lower-lying regions are shaped by deep histories of enclosure and agricultural transformation (Figure 1). This makes England, and Britain and Ireland more broadly, an important region in which to observe and understand the relations between land enclosure, agriculture, and society from a long-term perspective.

The time-depth of these preserved land divisions has been long recognized. Eighteenth- and nineteenth-century antiquarians, such as William Stukeley and Richard Colt Hoare, first identified later 'prehistoric' field systems (Johnston,



Figure 1. Earthworks of Iron Age/Romano-British field systems and enclosures at High Close, Grassington, North Yorkshire. The term coaxial fields refers to their adherence to a dominant alignment, often north-east to south-west, or north-south. The Grassington fields are associated with a range of other monuments including cairns, trackways, and enclosure compounds. © Historic England Archive, 20845_050 25-NOV-2008.

2013), while Philip Crocker's survey for Colt Hoare at Stockton, Wiltshire, identified Romano-British settlement overlying earlier field boundaries (Hoare, 1810: 39). In the early twentieth century, O.G.S. Crawford and the Curwens described the character of 'prehistoric' field systems (Crawford, 1923; Curwen & Curwen, 1923), and Toms (1925) speculated that the field systems in Cranborne Chase, Dorset, dated to the Bronze Age or earlier. Around the same time, there was a growing interest in medieval field systems, especially open fields (Gray, 1915).

Subsequent archaeological work has refined our knowledge of the extent and character of land divisions of all ages (e.g. Bradley, 1977; Fleming, 1988; Yates, 2007; Oosthuizen, 2013; Rippon et al., 2015; Ten Harkel et al., 2017). Yet, despite their common occurrence and importance, the

timing and tempo of their emergence and expansion is poorly understood. Attempts at synthesis between regions are hampered by the absence of robust scientific chronologies. For example, in southern England, Field (2008) suggested two major events of land division in later 'prehistory', while noting the need for an independent chronological framework. These are: the emergence of 'Celtic' and coaxial field systems in the mid-second millennium cal BC, and the layout of larger, ranch-like land units in the first millennium cal BC.

The earliest examples of land divisions currently known in Britain date to the Early Bronze Age (e.g. Martin et al., 2012), while more appear later in the second millennium cal BC (e.g. Framework Archaeology, 2011). In some areas, the establishment of new field systems probably declined in the Iron Age (e.g.

Lambrick & Robinson, 2009: 80 ff; Sharples, 2010: 43) while different types of boundaries, such as linear earthworks and pit alignments, emerged (e.g. Bradley *et al.*, 1994; Rylatt & Bevan, 2007). Field systems were established in many areas in the Romano-British period (e.g. Garton *et al.*, 2008) and had a variable impact on the shape of later, medieval landscapes (Rippon *et al.*, 2015), which themselves evolved over time (e.g. Oosthuizen, 2013).

While the economic importance of field systems is obvious, they do more than enclose resources; they reflect aspects of social organization, including degrees of social stratification, control over people and animals, and ideas about ownership, belonging, and identity. Variation between regions may also suggest different trajectories of change; but the absence of independent chronologies severely limits our interpretations (see Løvschal, 2014).

Here, we address this lacuna by using the data acquired through development-led archaeology (some eighty per cent of scientific dates from sites in England), along with data from published sources, to produce the first robust chronology for land division features from a region of Britain. We have chosen Yorkshire and the north-east Midlands (Figure 2), areas with well-preserved land divisions from various periods but with a specific regional character and historical trajectory that is distinct from better known parts of Britain such as southern England.

THE STUDY REGION

Evidence from across Yorkshire and the north-east Midlands shows a wealth of types of land divisions that are thought (on the basis of relative typo-chronologies) to date from the Bronze Age onwards. In the north-east Midlands, Bronze Age field systems have been identified in both upland

and lowland contexts, for example in the Lower Welland valley in Lincolnshire and on the East Moors in Derbyshire (Willis, 2006: 94–5). By contrast, the main period of field system creation in Yorkshire appears to be the Iron Age, though linear earthwork land divisions on the Wolds were in use by the end of the second millennium cal BC (Manby *et al.*, 2003; Mackey & Manby, 2003). The so-called embanked ‘Celtic field’ systems, for example at Craven in North Yorkshire (King, 1985), have no satisfactory chronologies. They are often suggested to have been established in the Iron Age but could equally have resulted from Bronze Age activity (Manby *et al.*, 2003: 103).

In some parts of the study area, the appearance of enclosed field systems seems to be a later development, spanning the Late Iron Age and Early Romano-British periods; this includes the distinctive ‘brick-work plan’ coaxial systems found by aerial photography on the Sherwood Sandstones of northern Nottinghamshire and South Yorkshire (Willis, 2006: 113; Garton *et al.*, 2008; Figure 3). Aerial mapping has also provided good, if fragmentary, information about the general layout and extent of field systems for the Iron Age and Romano-British periods of the Lincolnshire Wolds and the valleys of the Trent and Welland (Willis, 2006: 145). Field systems assumed to be of Iron Age or Romano-British date are also known in the Yorkshire Dales (Horne & MacLeod, 1995).

Later ‘prehistoric’ linear ditch systems are numerous in parts of the study region, including south-west Lincolnshire, where a band of multiple-ditched linear boundaries cross the Jurassic Limestone Ridge (Willis, 2006: 123). However, there are relatively few Romano-British and post-Roman earthworks within the north-east Midlands, the Grey Ditch in Derbyshire is the clearest example (Guilbert & Taylor, 1992). The Yorkshire Wolds dyke systems appear to have had a long history of

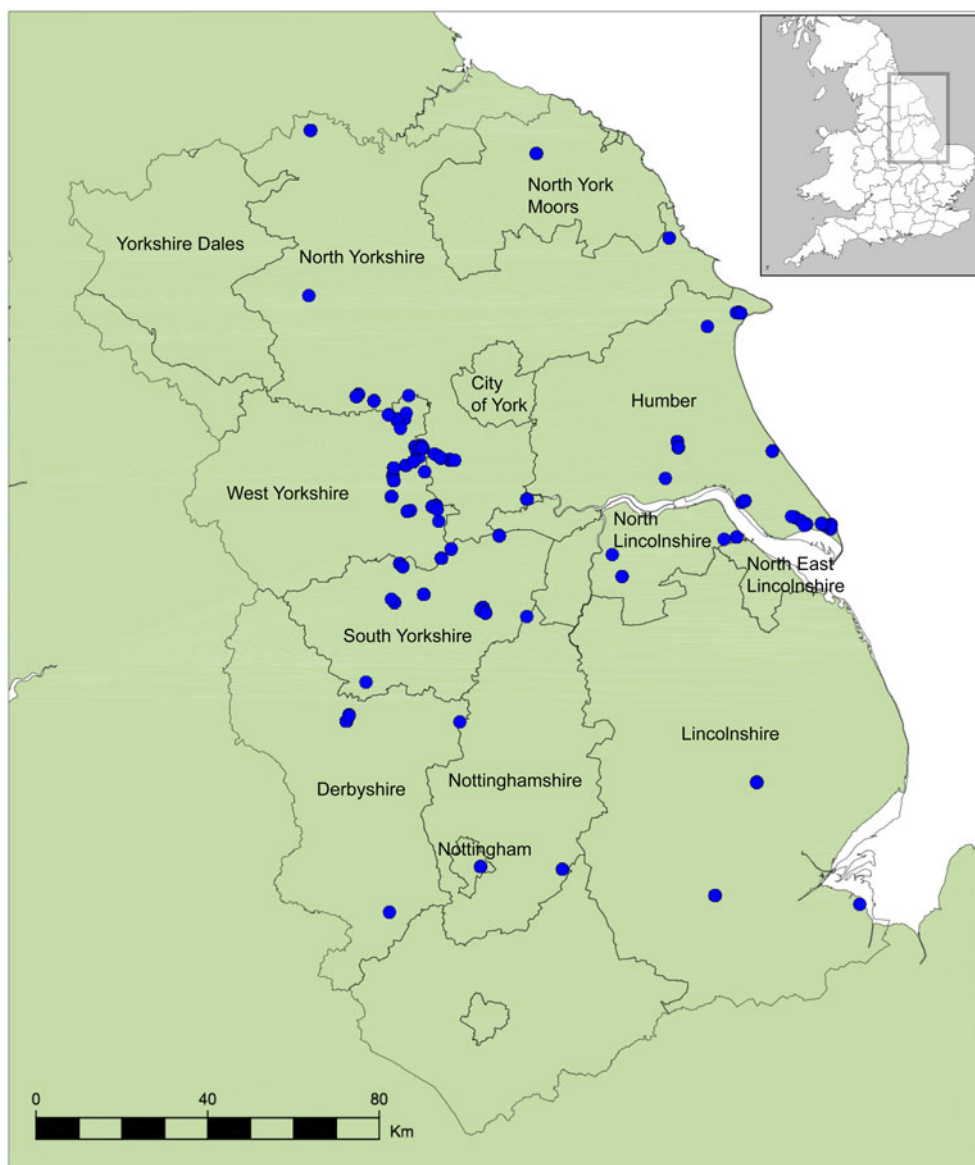


Figure 2. *Historic Environment Record (England) regions included in this study, showing the locations of sites with scientific dates discussed.*

development from the Late Bronze Age to the Late Iron Age or beyond (Dent, 1984; Giles, 2012), without major disruption to the landscape organisation. Pit alignments are also found on the Yorkshire Wolds as cropmarks; the associated banks survive in places on the North York Moors, for example on the Tabular Hills (Spratt,

1988). When these features are excavated, they usually appear to be associated with ‘prehistoric’ activity, though Romano-British examples are also known.

In the medieval period, most of the region was part of the ‘Central Province’ as defined by Roberts and Wrathmell (2002). This was a broad sweep of land

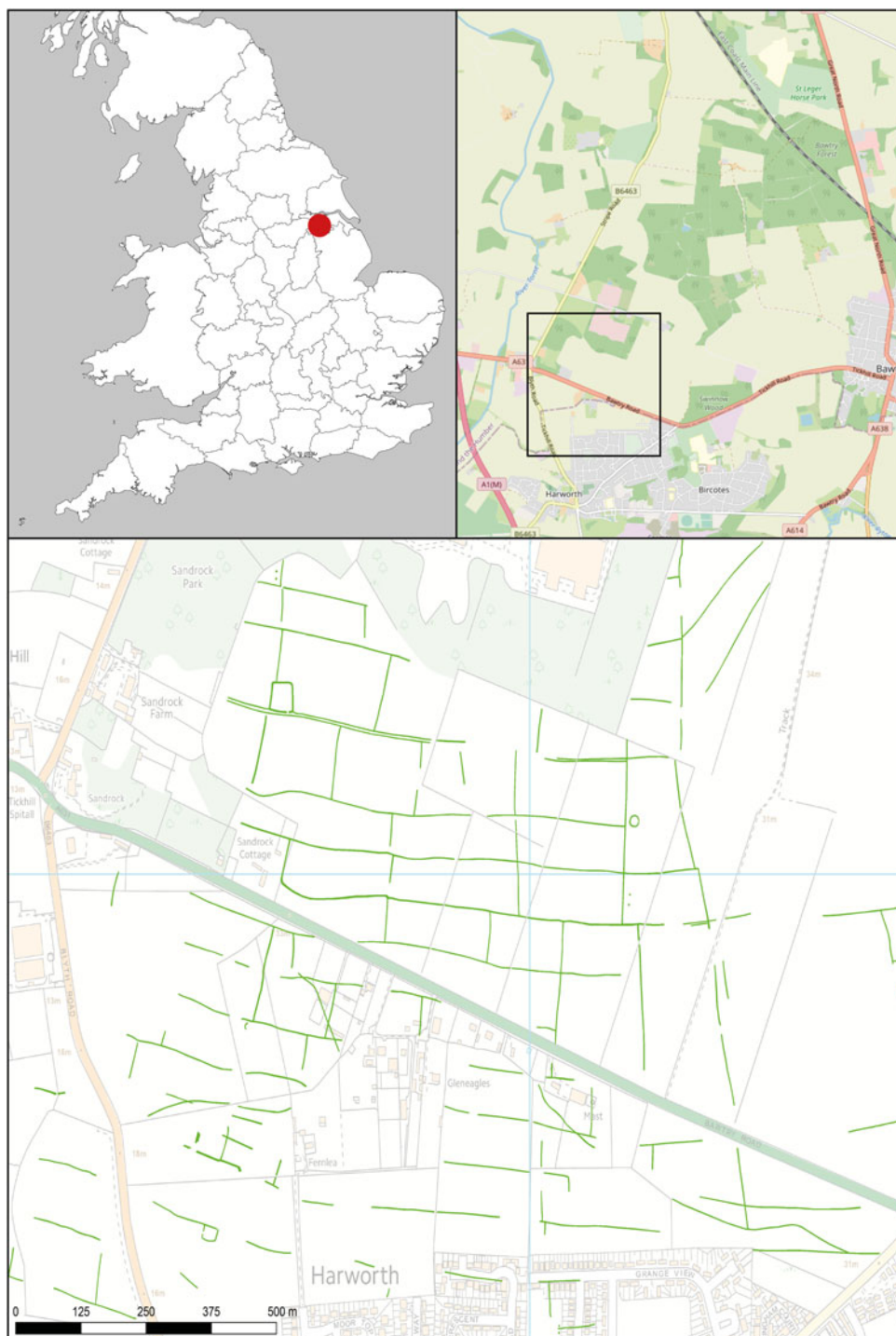


Figure 3. Cropmarks of Iron Age/Romano-British coaxial fields north of Harworth, South Yorkshire, and inset showing the general location of Harworth. Base map and data from OpenStreetMap and OpenStreetMap Foundation. Aerial mapping © Historic England. Basemap © Crown Copyright and database right 2021. All rights reserved. Ordnance Survey Licence number 100019088.

extending from Dorset on the south coast to the north and east, encompassing the area east of the Pennines. Much of the landscape here is known as a ‘champion landscape’, with arable land organized into open fields divided into strips and cropped under a two- or three-year rotation. Once extensively covered with ridge-and-furrow, much of the medieval landscape has been destroyed by modern cultivation, though parts of the north-east Midlands retain well-preserved areas of ridge-and-furrow field systems, including areas of Lincolnshire.

The field systems of ‘non-champion’ regions—such as the Lincolnshire fenland, northern and western Derbyshire, Nottinghamshire, and the Pennines—tend to be less regular and were organized in a variety of ways; these regions have generally been little studied (Lewis, 2006: 207). An exception is the Yorkshire Dales, where the well-preserved field systems associated with medieval townships have revealed many phases of development from the seventh to the seventeenth century AD (Moorhouse, 2003).

PROJECT APPROACH

Our aim was to examine changes in practices of land division across traditional culture historical divisions in this region, in particular changes in the scale and rate of land division over the very long term. We were interested in what a study at this scale might indicate in terms of the social contexts in which these changes took place. We collected scientific dating evidence associated with a wide range of land division types: aggregated field systems, coaxial field systems, enclosures, settlement enclosures, stock enclosures, field boundaries, boundary ditches, ditches, dykes, pit alignments, linear earthworks, and trackways or droveways (Figures 1 and 3; Supplementary Material Figures S2–S10

and Supplementary Material Table S1 for land division definitions). Several of these feature types are not classic ‘field systems’, but we selected a broad sample to examine land division in the widest sense.

Building robust chronologies for land division presents several distinct challenges. The first hurdle is semantic: when does a ‘ditch’ become a ‘field boundary’ (see Chadwick, 2008), especially when identified in a narrow evaluation trench? For this study we chose to rely on the terminologies used in the excavation reports.

Establishing a robust scientific chronology for land division is by no means straightforward. Samples for radiocarbon dating from land divisions rarely come from clearly understood ‘archaeological events of interest’, and infrequently represent *in situ* activities, Gwithian in Cornwall is one of a few known exceptions in Britain (Nowakowski, 2009). We can think about the ‘archaeological event of interest’ as some form of distinct anthropogenic activity. It could be, for example, the point in time when a field system is first excavated, or the system deconstructed. However, any samples for radiocarbon measurements from this feature may not be well-associated with the *excavation* of the field system (see discussion below). Land divisions are often negative features in which materials suitable for radiocarbon measurement can accumulate. However, this accumulation can result from a variety of complex processes (for example, manuring using midden deposits), and features may fill and be recut over long periods (Johnston, 2005). Samples from such features have the potential to be residual. For example, the Bronze Age field systems at Fengate, Peterborough, Cambridgeshire, were originally dated to the Late Neolithic because their fills contained Grooved Ware pottery. The pottery had been redeposited in the field ditches when their digging disturbed earlier features (Evans, 2009).

Producing robust estimates for the establishment of land divisions is, therefore, challenging. In many cases, while ecofacts from within land divisions may not directly relate to the establishment or decommisioning of a boundary, such material may provide estimates for a boundary's active use in a landscape.

In the examples identified in our study, there are no chronometrically dated samples that have a clear functional relationship (Waterbolk, 1971) with the establishment of these features. This may partly be due to the underlying geology of parts of our study area, which affects bone preservation in some cases. It may also reflect past activities associated with land division, as opposed to the more frequent occurrence of placed deposits in more obviously 'monumental' structures or settlements.

To address these issues, we applied two analytical approaches: one uses site-specific Bayesian analysis of scientific dates, and then 'currency models' to explore the timing and tempo of types of land division (see Supplementary Material for discussion). The other looks at long-term patterns in the scale and frequency of all forms of land division over some 3000 years. Our approach was designed to look in a granular fashion at the temporal 'currency' of different types of land division, but also to shift perspective and examine the long-term trends in all the evidence available. This dual approach makes it possible to think about complex and difficult datasets in different ways.

METHODS

The data collection methods, modelling choices, and results are comprehensively discussed in the Supplementary Material, which also provides full references for the individual sites and every chronometric measurement used in our analysis. The

reporting follows criteria outlined in Bayliss (2015). As with any 'legacy data' project, there are strengths and challenges when dealing with such an inheritance.

Bayesian chronological modelling was undertaken using the program OxCal v4.3 (Bronk Ramsey, 2009) and the calibration dataset of Reimer *et al.* (2013). The chronological models for each site are described (see Supplementary Material) and defined exactly in the figures and the OxCal code (Supplementary Material). In the text and tables, the Highest Posterior Density intervals of the posterior density estimates are given in italics, followed by a reference to the relevant parameter name and the figure in which the estimate is defined. Our other approach to long-term trends is afforded by Kernel Density Estimation (KDE; Bronk Ramsey, 2017), a widely used non-parametric method for estimating underlying distributions of discrete data points (here, dated samples). The number of samples selected for radiocarbon measurements will affect these KDE distributions; for example, if fewer measurements were commissioned from boundaries containing Romano-British material culture, this part of the KDE plot will be lower. This analysis does, however, allow us to take the long view of the available evidence for land division as a whole across different feature 'types', and traditional culture historic or period divisions.

RESULTS

The number of active likelihoods (radiocarbon dates and posterior density estimates) and sites represented in the currency models for each type of land division is shown in Figure 4. By far the most frequent feature type from which chronometric measurements are produced are discrete enclosures; this may reflect their relative frequency over time, but also

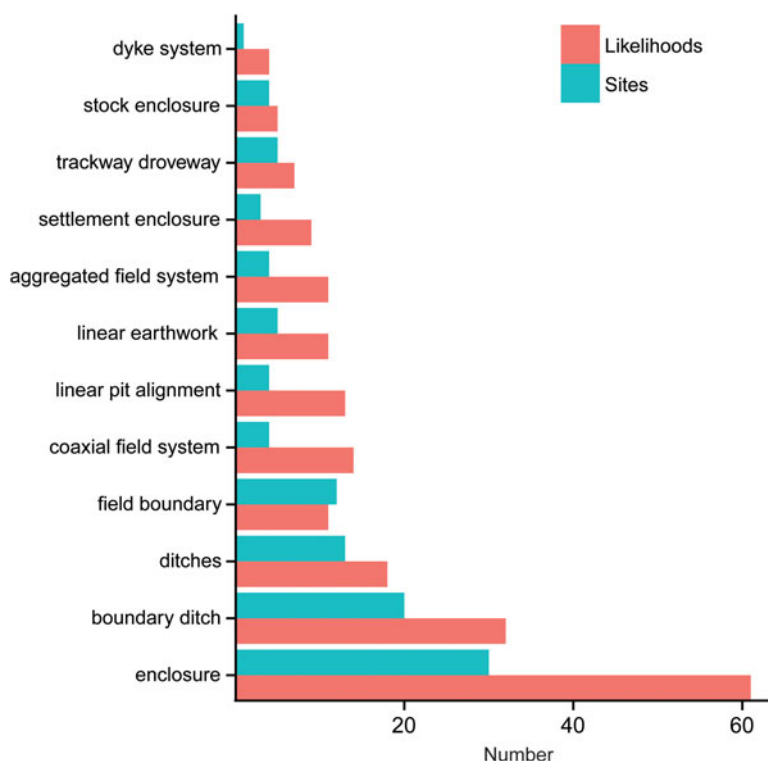


Figure 4. The number of active likelihoods used in the currency model for different types of feature (in red), and the number of sites with active likelihoods (in blue).

that they are more likely to be positively identified as ‘sites’ and subject to more chronometric measurements than simple linear features.

Figure 5 shows a summary of the model for land division (see Supplementary Material) and a timetable for the appearance of different feature types. Overall, land division began in 1815–1490 cal BC (95% probability; *Start_Start_Dividing_the_Land*; Figure 5), but the timescale of the beginnings of land division was very drawn out, spanning 785–1280 years (95% probability; distribution not shown). In our region, there was a very slow uptake in practices of enclosing and dividing the land. Key estimates for the beginning of use for each class of land division are summarized in Table 1 and Figure 6. Aggregated field systems were the first class of land division to appear in the

second quarter of the second millennium cal BC, followed by features identified by excavators as individual ditches (which could, of course, be parts of field systems) and then enclosures (discrete features not part of a field system).

After c. 800 cal BC, there is a marked change in the tempo and variety of land division, with the first appearance of a much wider range of types of land division between 800–400 cal BC. These include stock enclosures (770–505 cal BC; 95% probability; *first_stock_enclosure*; Figure S97), trackways (780–470 cal BC; 95% probability; *first_trackway*; Figure S94), boundary ditches (725–690 cal BC; 2% probability; or 665–305 cal BC; 93% probability; *first_boundary_ditch*; Figure S92), and linear earthworks (670–410 cal BC; 95% probability; *first_linear_earthwork*; Figure S104; Supplementary Material: Table 1).

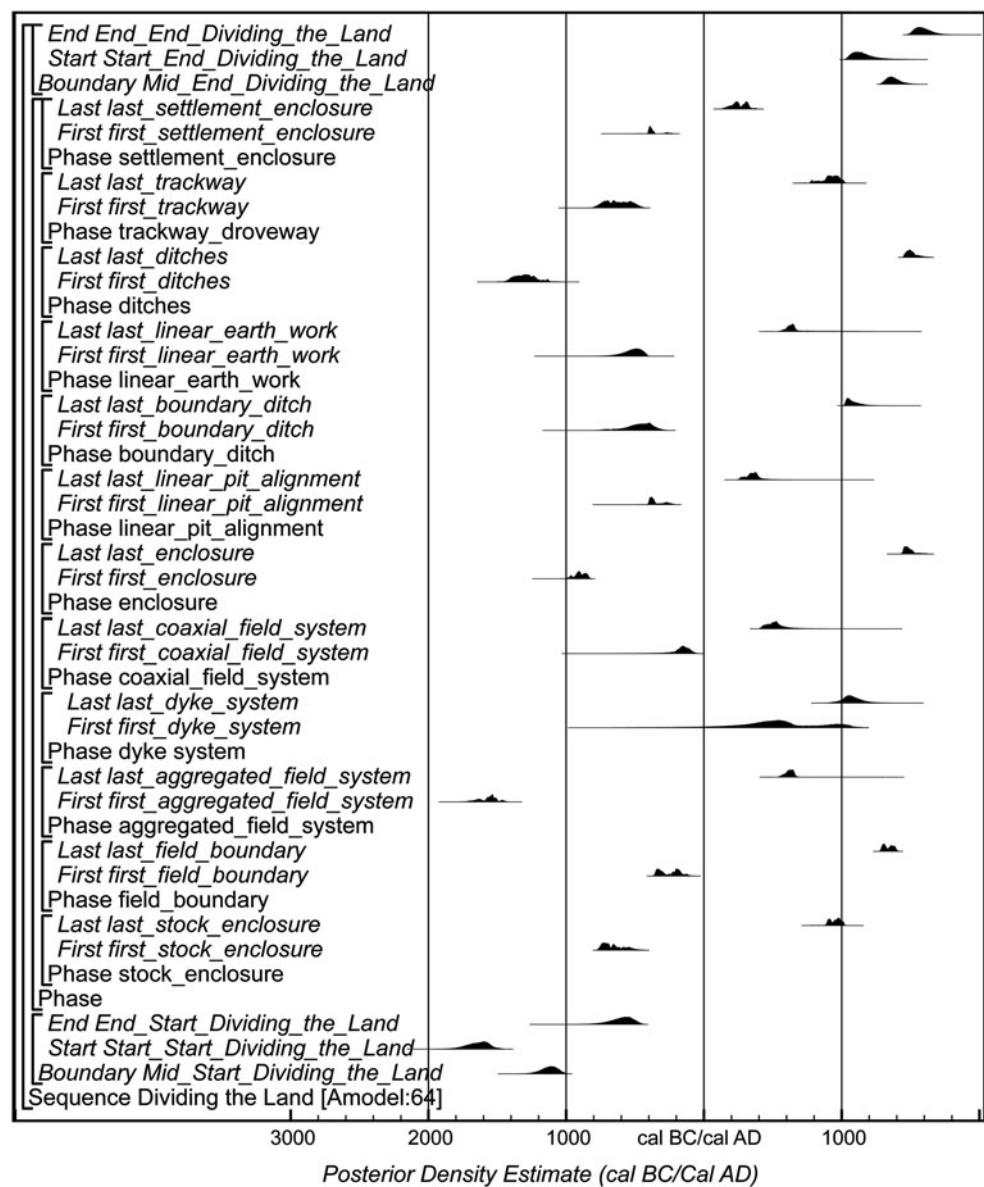


Figure 5. Overall structure of the chronological currency model for all the data analysed as part of ‘Dividing the Land’ project calculated using trapezium boundary parameters (Lee & Bronk Ramsey, 2012). The component sections of this model are shown in detail in Supplementary Material, Figures S88–S105. The distributions shown here are posterior density estimates produced through the Bayesian analysis. The large square brackets on the left-hand side of the figures, along with the OxCal keywords, define the model exactly, as does the code in the Supplementary Material.

Further types of land division begin to appear most probably after 400 cal BC, including the first appearance of linear pit alignments (410–230 cal BC; 95% probability;

first_linear_pit_alignment; Figure S103), field boundaries (360–115 cal BC; 95% probability; *first_field_boundary*; Figure S88), coaxial field systems (365–50 cal BC; 95% probability;

Table 1. Highest Posterior Density intervals for the currency of different classes of land division in Yorkshire and the north-east Midlands, calculated by the currency model shown in Figure 5 and Supplementary Material Figures S88–S105.

Parameter name (Figure 5)	Highest Posterior Density interval (95% probability unless otherwise stated)
<i>Start_Start_Dividing_the_Land</i>	1815–1490 cal BC
<i>Mid_Start_Dividing_the_Land</i>	1250–1010 cal BC
<i>End_Start_Dividing_the_Land</i>	785–450 cal BC
<i>Duration_Start_Dividing_the_Land</i>	795–1280 years
<i>Start_End_Dividing_the_Land</i>	cal AD 1030–1340
<i>Mid_End_Dividing_the_Land</i>	cal AD 1285–1480
<i>End_End_Dividing_the_Land</i>	cal AD 1490–1715
<i>Duration_End_Dividing_the_Land</i>	200–650 years
<i>first_aggregated_field_system</i>	1715–1490 cal BC (88% probability) or 1485–1440 cal BC (7% probability)
<i>last_aggregated_field_system</i>	cal AD 545–675
<i>first_ditches</i>	1435–1125 cal BC
<i>last_ditches</i>	cal AD 1445–1590
<i>first_enclosure</i>	980–830 cal BC
<i>last_enclosure</i>	cal AD 1435–1590
<i>first_stock_enclosure</i>	770–505 cal BC
<i>last_stock_enclosure</i>	cal AD 890–1020
<i>first_trackway</i>	780–470 cal BC
<i>last_trackway</i>	cal AD 775–1020
<i>first_boundary_ditch</i>	725–690 cal BC (2% probability), or 665–305 cal BC (93% probability)
<i>last_boundary_ditch</i>	cal AD 1010–1215
<i>first_linear_earth_work</i>	670–410 cal BC
<i>last_linear_earth_work</i>	cal AD 540–1040
<i>first_linear_pit_alignment</i>	410–230 cal BC
<i>last_linear_pit_alignment</i>	cal AD 250–480
<i>first_field_boundary</i>	360–115 cal BC
<i>last_field_boundary</i>	cal AD 1285–1400
<i>first_coaxial_field_system</i>	365–50 cal BC
<i>last_coaxial_field_system</i>	cal AD 405–710
<i>first_settlement_enclosure</i>	415–350 cal BC (81% probability) or 290–230 cal BC (14% probability)
<i>last_settlement_enclosure</i>	cal AD 145–345
<i>first_dyke_system</i> (renamed from 'start_Danby_Rigg' in Supplementary Material)	cal AD 100–1110
<i>last_dyke_system</i> (renamed from 'end_Danby_Rigg' in Supplementary Material)	cal AD 930–1230

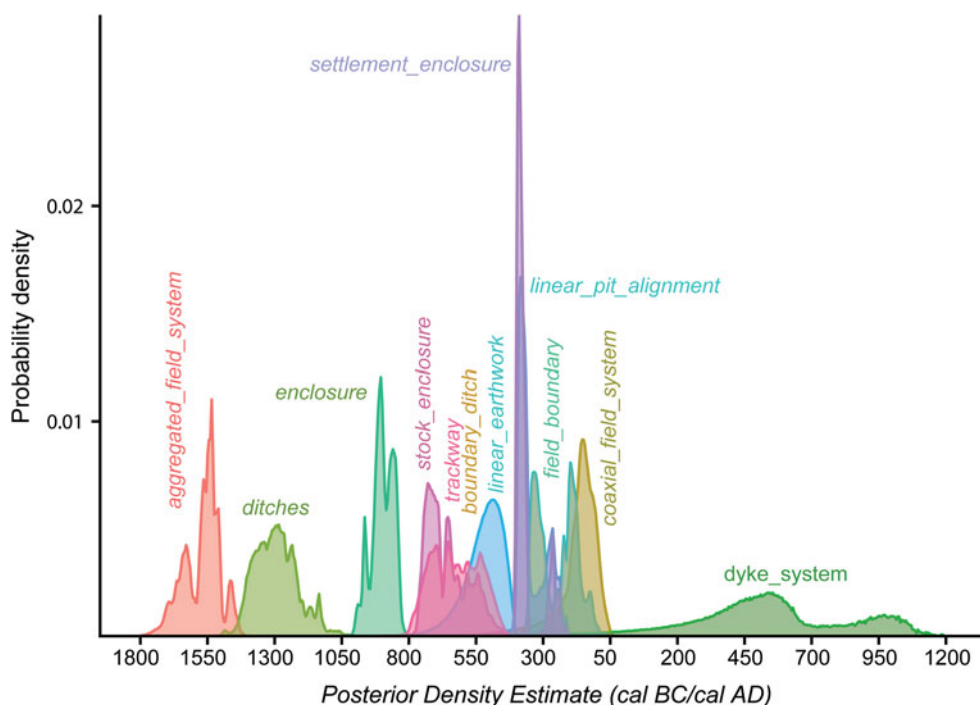


Figure 6. Probability distributions of dates for the start of land divisions (some of the tails of these distributions have been truncated to enable detailed examination of the highest areas of probability), derived from the model shown in Figure 5.

first_coaxial_field_system, Figure S90), and settlement enclosures (415–350 cal BC; 81% probability or 290–230 cal BC 14% probability; *first_settlement_enclosure*, Figure S100).

THE USE OF LAND DIVISIONS

Figure 7 provides a long-term, landscape-scale impression of the intensity of change across the whole study region. Different types of land division had relatively long periods of use. This may derive in part from issues of taphonomy of the dated samples, and from histories of reuse, which may be important indications of related social practices (see below).

Four ‘big trends’ of archaeological interest are highlighted by the KDE plot. First, there was a very low level of land division until *c.* 700 cal BC. This suggests

that, in contrast to areas in southern Britain, Bronze Age fields were sparsely distributed across the region. This pattern appears to be real for three reasons.

We would expect negative features used for Bronze Age land division to be identified through excavation, if they existed, since later features on the same underlying geology are being found by excavation in the region. Secondly, the regional Bronze Age ceramic chronology is not so precisely dated that researchers would dismiss the opportunity to obtain radiocarbon measurements (see discussion of Romano-British material below). Finally, given that there is other evidence of Bronze Age activity in the region (e.g. Clay, 2006: 82–3; Richardson, 2011), this trend does not reflect a general absence of Bronze Age activity in the region.

A second ‘big trend’ occurs from *c.* 700 cal BC. A rapid increase in dated samples

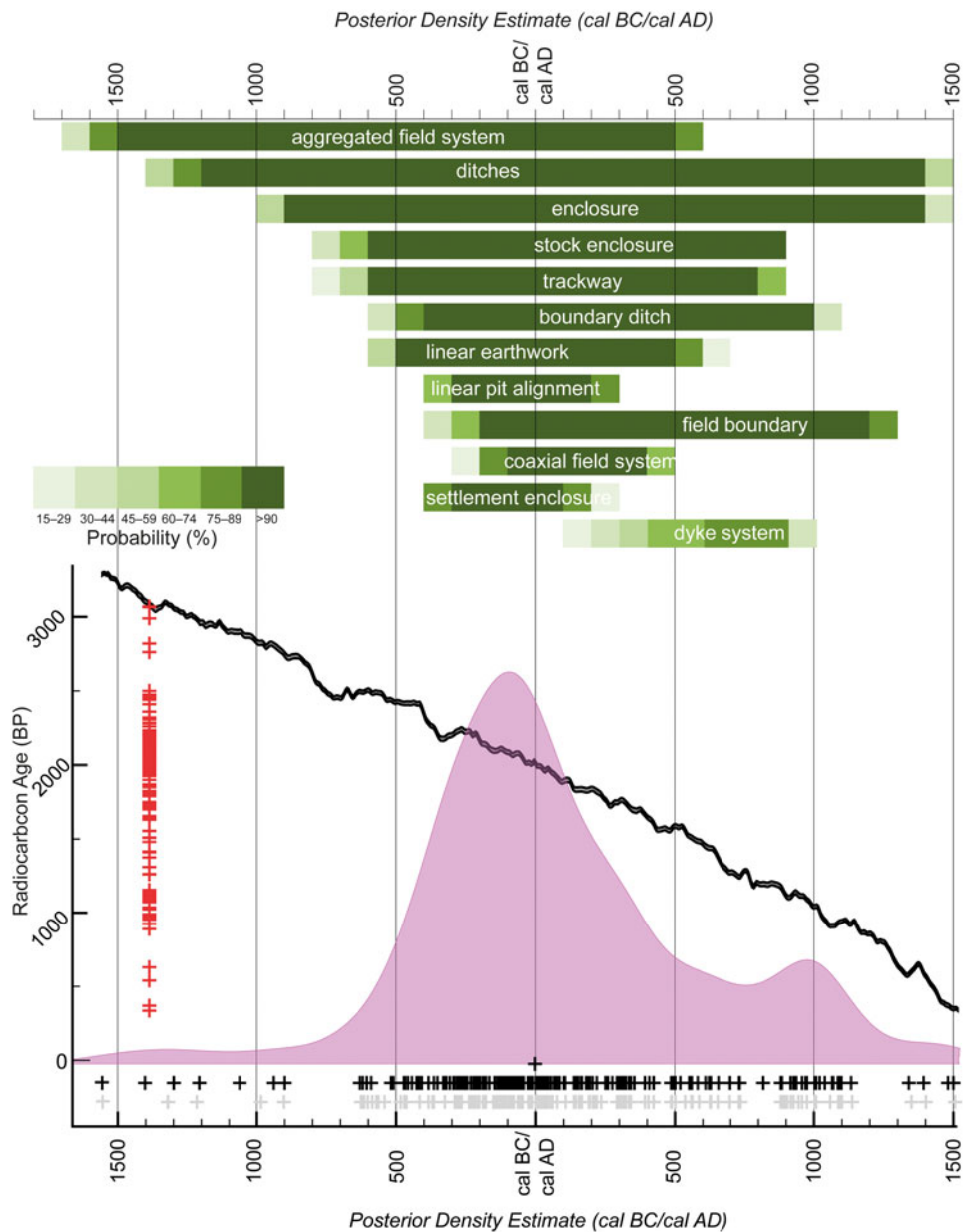


Figure 7. Top: schematic diagram showing the use of land divisions in Yorkshire and the north-east Midlands; horizontal bars represent the probability that a land division type was in use in each 100-year period (darker shading indicates higher probability). Bottom: Kernel Density Estimate for the plot of the overall distribution of posteriors associated with land division in the study area. The estimate is calculated for the whole dataset in the model shown in Figure 6. The black crosses represent the medians of the posteriors, with the medians of the calibrated results in grey. The medians indicate the distribution of results over time. The red crosses are uncalibrated medians of radiocarbon results. The Kernel Density Estimate is plotted against the calibration curve, which is shown in black.

peaks in the first century cal BC, to gradually fall until *c. cal AD 800*. We suggest that this represents significant increases in land division from the earlier part of the Iron Age onwards, with the greatest intensity around *1 BC/AD*. In terms of types of land division, enclosures, trackways, and linear earthworks mark the earlier part of the Iron Age, with new types of land division and increasing numbers of field systems documented in the later Iron Age and Romano-British periods.

A third trend consists of a further small rise in land division, peaking at *c. cal AD 1000*, which appears to correlate with the creation of villages and open fields in the Central Province (as defined by Roberts & Wrathmell, 2002). This is generally assigned to the period from the eighth to tenth centuries AD (Rippon et al., 2015: 97–9, 329–31). The ‘Harrying of the North’ between AD 1069–70 (i.e. the campaigns to suppress northern England after the Norman conquest) has also been suggested to have resulted in the large-scale reorganization of landscapes across northern England, with villages established or rebuilt, and monastic estates founded (Hadley, 2000: 173), though others have suggested that the changes in settlement form reflect longer-term trends (Creighton & Rippon, 2017: 76–7). The peak in our analysis appears to occur slightly earlier than the conquest—in the tenth and eleventh centuries cal AD. This suggests that enclosure in these centuries was part of a much lengthier pattern of change, underway before the Norman conquest. This would seem to be closer to the date range often suggested for the nucleation of settlement across the Central Province, and closer to the period of Scandinavian settlement and political control in this part of England under the Danelaw (i.e. northern, central, and eastern parts of early medieval England originally colonized by the Danes where a form of law that differed from West Saxon and Mercian laws prevailed).

A final important observation emerges from comparing the output of our two analytical approaches (Figure 7) with respect to the magnitude of these long-term changes. By comparing the trend after *c. 700 cal BC* and that around *cal AD 1000* with the shape of the calibration curve, we can be confident that the trends are real, since they are independent of the calibration dataset.

The division of the land after *c. 700 cal BC* is of a much greater magnitude than that documented in any other period. There was a significant change in both the frequency and scale of land division in the last quarter of the first millennium cal BC: people became more active in dividing the land over the course of the Iron Age and employed new ways of doing this. This appears to have started with individual enclosures and land divisions perhaps associated with routeways and large-scale divisions across the landscape, to a gradual increase in emphasis on parcelling up the land over the Iron Age.

DISCUSSION: TIMESCAPES

The approach we have taken here can be classed as a ‘timescape’. This way of proceeding combines different analytical approaches to evidence for change across traditional culture historical divisions (Griffiths, 2017). In this case, we have constructed robust, formal chronologies at a broad scale across these traditional culture historic divisions.

While not suggesting that the significant trends we have identified reflect the same concerns in all periods, we can say that the increased and intensive demarcation of space at given times suggests profound social change in terms of regulation of movement, access to land, and a heightened interest in demonstrating social inequalities, perhaps underscored by changing notions of land tenure and ‘ownership’.

The signal we have identified in Yorkshire and the northern Midlands over the Iron Age is most striking, and suggests an increasing emphasis on social hierarchy and identity. We may be able to see this in the limited number of prominent enclosed settlements such as Stanwick (Haselgrove, 2017). Notably, in the Arras burials of the Yorkshire Wolds (late fifth to early first century BC), we see a society interested in the production and display of identity and status (Giles, 2012; Jay et al., 2012: 181). Outside our study areas, other evidence of social changes at this time include: the reorganization of the landscape in regions such as Wessex, which has been the focus of more research (Cunliffe, 2004); growing numbers of enclosed settlements that may indicate heightened social and ‘functional’ differentiation and, perhaps, instability (Thomas, 1997); and an increase in votive deposits and metalwork hoards (Bradley, 1990).

Our evidence suggests that societies in our region might have seen the beginnings of social differentiation several hundred years before the Late Iron Age flourish. From *c.* 700 cal BC onwards, patterns that are consistent with an increasing concern for regulating access to land and demonstrating associations with land emerge, perhaps to express individual and group identity and status, and, increasingly, as a form of social capital. This emphasis on land division, and the social processes it indicates, may not have taken place as early as in southern England, but it was well before the emphasis on differentiation and identity evident in the later Iron Age Arras burials, for example. We suggest that these later Iron Age processes of creating identities, social differentiation and these later patterns of inequality therefore may have much earlier roots, beginning with changes apparent in the rate of land division from *c.* 700 cal BC onwards. These land divisions may represent changing

agricultural practices; however, direct comparative dating studies on the frequency of domesticates from across the study region (as well as other evidence for agricultural practices) would be needed to establish this independently. In a region where increasing evidence for interest in defining social identity in the later Iron Age is evident, these features can be seen as media through which people created markers of tenure, inheritance, and relatedness (Giles, 2007).

These social changes are emphasized by the changes in frequency and form of land demarcation over the Iron Age; this is not ‘simply’ an increase in the appearance of nucleated villages and open fields. Such frequency is unlikely to be an effect of the shape of the calibration curve or sample bias; those archaeologists researching the second half of the first millennium cal BC are often disinclined to obtain radiocarbon measurements because of a perception that the shape of the calibration curve will not be precise enough to address their research questions (Hamilton et al., 2015). That we still identify this signal at a time when researchers might be less likely to submit radiocarbon samples—if they suspected material to be ‘Iron Age’—emphasizes the significance of this pattern. Moreover, our approach, emphasizes the *scale* of this change in organization of the landscape compared to what went on at other times.

The peak in evidence for land division in the second half of the first millennium cal BC is unlike that observed in any other period in Yorkshire and the north-east Midlands; the transformation was substantially different in nature from any earlier type of land division. This landscape reorganization was perhaps the most significant and profound reordering of space witnessed in the British countryside until the forced enclosures under the Acts of Parliament from the eighteenth century AD onwards (Wordie, 1983). Certainly,

the changes that occurred over the first millennium cal BC were of a substantially different nature than any type of land division that had occurred before.

Switching between scales also allows critical consideration of regional trends in landscape development. Our region lacks the extensive rectilinear field systems that were widespread in southern Britain during the second millennium cal BC (Yates, 2007). The earliest land divisions in Yorkshire and the north-east Midlands begin with localized aggregated enclosures, more characteristic of western and northern Britain. Our region's large-scale lowland field systems have a distinct identity within the landscapes of enclosure of the first millennium cal BC in north-western Europe (Løvschal, 2020), though this pattern may also reflect the focus of development-led work on lower-lying landscapes.

The decline in the signal for land division in the Romano-British period may be due to several factors. A continuity of land divisions established in the first millennium cal BC may have played a part, as could a dearth of radiocarbon results obtained for samples from Romano-British features, for which typo-chronological dating is often more precise than for the preceding periods. Alternatively, the types of land division used in Romano-British societies could have relied less on substantial negative features, with boundaries defined by lighter fencing or hedging, for example.

Continuities in landscape organization into the early post-Roman period have been suggested at individual sites (e.g. Vervust, 2020), while Rippon *et al.* (2015) concluded that sixty-four per cent of excavated late Romano-British fields in lowland England and Wales (and seventy per cent in their Central Zone) had shared alignments with medieval field systems (see also Oosthuizen, 2013). By contrast,

Chadwick (2010: 444) argued for a discontinuity between Romano-British and medieval fields across the lowlands of our study region. Our own approach shifts the emphasis towards the reasons why the timing of land division was so variable across different regions, and especially how the rate of change varied.

We have identified a number of themes that could be addressed by future research. First, we need more robust data. The existing corpus of scientific dates for different types of land division (Figure 5) highlights a situation that can only be improved through chronologies for individual sites. In our study area, and north-western Europe generally, it is development-led archaeology that is leading this work. Marked variations in the intensities of land division through time have been identified, but finer resolution for our histories may be hindered by the plethora of terms used to describe categories of land division. This is an expression of a wider problem. For example, terms such as 'Celtic fields' refer to quite different land divisions in across north-western Europe (e.g. Whitfield, 2017, Neilsen *et al.* 2018).

Second, we need to revisit our approaches to writing histories. While site-specific Bayesian models can radically alter our understanding of a sequence of change, we need to use different analytical lenses to think about the structure of our narratives and how we write about change (Griffiths, 2017). The land divisions of the second and first millennia cal BC are a north-western European phenomenon (Løvschal, 2020), and the ability to integrate British and European Iron Age evidence has been a subject of significant debate (Hamilton *et al.*, 2015). One cause of tension is that explanations of the links between Iron Age European communities are still led by material culture studies (e.g. Garrow *et al.*, 2009), although scientific dating has demonstrated that these models

can be extremely misleading (Jay et al., 2012).

Here, we have focused on exploring a region over the very long term, using a variety of analytical approaches to shift our interpretative lenses. The trends we have identified contrast with the picture for southern England, but they also show similarities and differences with areas further afield. There is clear potential for future research on an even broader scale. We need chronometric data and a range of analytical approaches to write histories that use chronological (rather than typological or culture historic) frameworks to structure our narratives of social change at a transnational scale.

CONCLUSIONS

While several overviews of land division in Britain and northern Europe have been produced recently (e.g. Chadwick, 2010; Ten Harkel et al., 2017; Løvschal, 2020), this study represents the first attempt at producing a long-term, geographically wide-ranging, robust chronology for the timing and tempo of land divisions that transcend traditional period boundaries for a region of the British Isles. It identified evidence for the origin of land divisions in Yorkshire and the north-east Midlands in the mid-second millennium cal BC, followed by an escalation after *c.* 700 cal BC and, again, a peak around cal AD 1000.

The taphonomy and associations of many of the dated samples in this study fall well-short of ideal sample selection criteria (Whittle et al., 2011: 38–40). Additional measurements from samples with well-defined taphonomies must be obtained. Where only material of uncertain taphonomy is available (e.g. disarticulated animal bones), multiple measurements on several types of materials or different species are required from the same context

to assess chronological robustness. These samples should comprise single entity, ‘short life’ samples, with radiocarbon reservoirs that are clearly understood.

To work effectively with ‘difficult’ legacy data, we have developed an approach that analyses site-specific models of results with well-understood ‘logical scaffolding’ (Chapman & Wylie, 2016) on the one hand, and KDE summaries on the other. Working from the site-specific, to currency models, to the regional *longue durée* provides complementary means to reassess such ‘difficult’ datasets. Furthermore, cutting across culture historical divisions offers a new perspective, allowing us to consider the relative scale of the radical changes in land organisation over the course of the Iron Age and after the Norman conquest in the context of a much longer trajectory of transformation. Analysing a specific type of land division, or class of monument, or ‘package’ defined by culture-historical parameters would not be sufficient to achieve this kind of long-term perspective.

Our approach has emphasized the significance of the scale of changes that affected the landscape after *c.* 700 cal BC, which would not have been apparent had we worked in a more traditional manner. The strength of this signal indicates a society where ideas about identity, status, and control of resources were being played out on the landscape in new ways, which dramatically escalated over several centuries, and which ultimately may have led to the social differentiation apparent in the first century cal BC. It is only by combining analytical approaches and taking the long view of land division that we begin to recognize quite how significant these changes were.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit <https://doi.org/10.1017/eea.2021.48>.

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La démarcation du territoire: aspects temporels de la division des terres dans le nord des Midlands et le Yorkshire en Angleterre

La parcellisation des terres est omniprésente dans la campagne anglaise. Les limites de champs, enclos, alignements de fosses et autres éléments de démarcation du territoire ont servi à le transformer et à le délimiter pendant des millénaires. Cependant, alors que ces divisions sont essentielles pour appréhender les mécanismes de l'économie et de l'approvisionnement, l'organisation du mode d'occupation des terres et de la propriété ainsi que la structure sociale et l'identité des communautés, l'histoire de ces parcelles demeure nébuleuse. Les auteurs de cet article présentent, pour la première fois, une chronologie bayésienne fiable des éléments de démarcation du territoire durant trois millénaires dans une région d'Angleterre. Cette approche novatrice leur permet d'examiner l'évolution du paysage sur la longue durée et de démontrer l'ampleur inattendue des divisions soi-disant « préhistoriques » mais plus récentes qui correspond sans doute aux débuts d'une hiérarchisation sociale croissante. Translation by Madeleine Hummler

Mots-clés: démarcation du territoire, parcellisation, modélisation bayésienne, transformation à long terme, radiocarbone

Die Aufteilung des Landes: Aspekte der Chronologie von Feldanlagen in den nördlichen Midlands und Yorkshire in England

Fast überall in der englischen Landschaft stößt man auf Spuren von verschiedenen Feldanlagen. Seit Jahrtausenden wurden Feldgrenzen, Gehege, lineare Grubenreihen und andere Einrichtungen errichtet, um die Landschaft zu gestalten und abzugrenzen. Obschon diese Landbereiche für das Verständnis der

Wirtschaft und der Versorgung der Ernährung, der Gliederung der Pachtwirtschaft und der Landsitze sowie der Sozialstruktur und Identität der Gemeinschaften entscheidend sind, bleibt ihre Nutzungsgeschichte unklar. Der vorliegende Artikel ist eine erste Veröffentlichung einer solider Bayesschen Chronologie der Feldanlagen, die während drei Jahrtausende in einer Gegend von England errichtet wurden. Dieser innovative Ansatz ermöglicht es, die langfristigen Veränderungen in der Landschaft zu untersuchen und das unerwartete Ausmaß der sogenannten „vorgeschichtlichen“ Feldanlagen zu dokumentieren. Letzteres entspricht wahrscheinlich dem Beginn einer zunehmenden sozialen Hierarchisierung. Translation by Madeleine Hummler

Stichworte: Landaufteilung, Feldanlagen, Bayessche Modellierung, langfristige Veränderungen, Radiokarbon